

Application No. 09/348,494
Amendment dated April 12, 2004
Reply to Office Action dated December 10, 2003

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Remarks

Claims 3-12 and 14-19 are pending, with claims 3, 5-12, 14, and 16-19 being in independent form. By the present amendment, claims 6-12 and 17-19 have been presented in independent form without changing the claims, and claims 1, 2, 13, and 20 have been canceled without prejudice or disclaimer.

Applicants acknowledge with appreciation the indication of allowability of claims 3-5 and 14-16.

Claims 1, 2, 6-13, 17-20 stand rejected for obviousness over a combination of Applicants' FIG. 3, Japanese Published Patent Application No. JP 7-15380 assigned to Kokusai Denki kk ("Kokusai"), and Japanese Patent Publication No. 411055168A to Okuhata ("Okuhata"). With respect to the now pending claims, each of these rejections is respectively traversed for the reasons below.

Applicant wishes to thank the Examiner for the courtesy extended during a telephonic interview with the undersigned representative on April 8, 2004. During the interview, the Okuhata document was discussed in connection with the rejections. The Examiner indicated that Okuhata does not appear to disclose some features of rejected dependent claims 6-12 and 17-19. Accordingly, the claims have been placed in independent form by this amendment. Since these claims have not changed and the Examiner has reviewed these claims before, this amendment does not raise new issues and should therefore be entered and considered.

The Action admits that the combination of FIG. 3 and Kokusai "does not specifically disclose the determination is based on demodulated processed radio frequency signals" (p. 3), but contends that "Okuhata teaches the determination is based on demodulated processed radio frequency signals" and that "using signal quality of a demodulated signal, or likelihood comparison, or bit error rate, or frame error rate, or signal to interference ratio, or number of retransmission required is known in the art" in the context claims 6-12 and 17-19. Applicants disagree.

As discussed in the previous response, Kokusai discloses only an envelope fading detector as the basis for turning on or off a second receiver, and thus is essentially the same as the arrangement depicted by Applicants' FIG. 2.

Okuhata discloses that the decision is based on received electric field intensity. In particular, Okuhatu states:

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A system controller 7A checks the received electric field intensity (E) detected by a received electric field intensity detection circuit 15. When the E is higher than a fixed value, the antenna is not switched based on the satisfactory reception state of the antenna 1. However, when E becomes lower than the fixed value, it determines that the reception state of the antenna 1 under reception at present has become worse. In this case, based on an effective symbol period signal inputted from the demodulator 5, an antenna selector 3 is controlled for switching to the side of an antenna 2, immediately after the end of an effective symbol period in the next transmission frame, so that the reception state can be kept satisfactory.

The Examiner relies on the underlined passage above to reject the claims. The underlined passage, however, is concerned with the timing as to when a switch-over to diversity should take place, not the "determination as to whether diversity is appropriate," as defined in the claims. That is, in Okuhata, the determination is already made based on the received, not yet demodulated or processed, signals, and only the timing of the antenna switchover is decided based on the symbol period signal inputted from the demodulator. This is not surprising, since Okuhata relates to the DAB standard, which uses OFDM as the modulation format. OFDM symbols are very long and changing reception conditions in the middle of such a symbol would effectively destroy the demodulation of that symbol. It is therefore very important to only change reception conditions exactly at the separation point between two symbols.

Okuhata makes it very clear that the decision to change antennas is made based on the received electrical field intensity of the signals prior to demodulation. The basic idea of using field strength, as in Okuhata and Kokusai, is to be able to detect when the signal goes through a fading dip (a loss of signal strength due to cancellation at the antenna) and in such cases be able to use the signal from the other antenna.

In contrast, the claims of the invention address the problem of interference in the signal. In modern "loaded" systems, the problem of interference is often much more severe than the loss of signal strength. The interference scenario differs on the two antennas and diversity gain improves overall reception. In contrast, signal strength alone gives little guidance on whether diversity gain can be achieved.

For example, in CDMA systems, many users share the same frequency, with each of their respective data signals being separated only by the spreading code

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used. In that case, the field strength would only indicate the strength of the combined signal of ALL users on the same frequency, and would offer no indication of the quality of a particular user's signal we are interested in receiving. The two antenna signals would instead need to be demodulated and processed in the baseband processing unit to tell what relative quality they have. The decision to employ diversity gain has to be based on properties of the signal after demodulation and processing in the baseband circuit, such as signal quality of a demodulated signal, likelihood comparison, bit error rate, frame error rate, signal to interference ratio, or number of retransmission required, as defined in the respective claims. This is not disclosed or suggested in the cited documents.

Applicants' monitoring of the quality of the demodulated signal addresses both the situation when signal strength drops (as in a fade) and when the quality drops due to interfering signals. This is not the true of Kokusai and Okuhata, which focus on signal strength only. In the case of interfering signals, the diversity (the second receiver) is used not to ensure signal strength but rather to get access to a second version of the received signal in which the interference affects the received signal differently. This difference can then be exploited to effectively cancel the interference.

The Action asserts that using quality measures other than signal strength or intensity would have been obvious modifications to FIG. 3, Kokusai, and Okuhata. Applicants' respectfully disagree for the reasons set forth above. Kokusai's use of "envelope intensity" and/or Okuhata's use of electric field intensity would not have suggested the use of bit error rate, frame error rate, or the other post demodulation techniques recited in the claims.

To establish a prima facie case of obviousness, the cited documents must teach or suggest all of the claim limitations and there must have been a reasonable expectation that the cited documents could have been successfully combined. The rejections cannot stand at least because no combination of the cited documents teaches all of the claim limitations as discussed above.

Accordingly, since the combination of Applicants' FIG. 3, Kokusai, and Okuhata fails to disclose or suggest all of the claim limitations for at least the above

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reasons, the obviousness rejections of pending claims 6-12 and 17-19 should be withdrawn.

Moreover if one had attempted to combine the disclosures of the cited documents, one would have been more likely to arrive at something that did not work at all or not in the manner claimed by the present application. As discussed above, one of ordinary skill in the art would have known that the features of FIG. 3, Kokusai, and Okuhata cannot be combined without further modification to reach the subject matter defined by claims 6-12 and 17-19. Interference aspects of the received signals would still be effectively ignored, with signal strength prior to demodulation being the only measure, which is inadequate as described above. In the absence of any suggestion in the cited documents of how to make such a combination operable, one would have faced a serious engineering problem that naturally would have had a low probability of success without substantial experimentation and effort, especially in view of the need to modify the teachings of the documents. It is well settled that "[t]he mere fact that the prior art may be modified in the manner suggested by the Examiner does not make that modification obvious unless the prior art suggested the desirability of the modification." In re Fritch, 23 U.S.P.Q.2d 1780, 1783-84 (Fed. Cir. 1992).

Accordingly, Applicant asserts that the combination of documents relied upon to support the obviousness rejection of claims 6-12 and 17-19 is improper, and respectfully requests the claim rejection be reconsidered and withdrawn for this reason also.

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For the foregoing reasons, Applicants believe entry of this Amendment would put the application in condition for allowance. Thus, it is respectfully requested that this Amendment be entered, and a Notice to this effect be provided. If any questions remain, the Examiner is invited to contact the undersigned at the below-listed telephone number.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

By: 

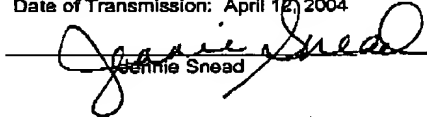
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